City of Sunnyvale

Wastewater Management Sub-element of the General Plan

2001 Update

Prepared by the City of Sunnyvale
Public Works Department

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Wastewater Management Sub-element

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EXECUTIVE SUMMARY

Purpose and Scope

Since the original Sanitary Sewer Sub-element was adopted by the Sunnyvale City Council in 1983, many significant changes have occurred that affect the City's wastewater collection system and Water Pollution Control Plant. Environmental requirements, pretreatment, recycled water, by-product reuse and the need for infrastructure replacement have all been impacted by new developments. This updated Wastewater Management Sub-element reflects changing conditions and provides a clearer vision of the future of sewage collection and treatment in the City. The Executive Summary presents an overview of key issues discussed in the main body of the Sub-element.

The Wastewater Management Sub-element establishes integrated goals, policies, and actions designed to:

1. Address current and future water quality requirements and regulations
2. Ensure that the Water Pollution Control Plant and wastewater collection system operate effectively and efficiently
3. Maintain the financial stability of the Wastewater Management Revenue Fund
4. Ensure that processed wastewater meets all water quality standards
5. Ensure that recycled water meets all water quality standards
6. Maintain the wastewater collection system and Water Pollution Control Plant to support the ongoing ability to meet collection and treatment objectives
7. Develop and maintain proactive energy management and by-product reuse programs
8. Engage in active pretreatment programs to encourage source reduction
9. Plan, schedule, fund and implement replacement of the aging wastewater management system and Water Pollution Control Plant infrastructure.

Key issues covered in this document include:

- Federal, state, and regional water quality regulations
- Watershed management approaches to water quality issues
- Production of recycled water as an additional supply source
- Management of water quality in an era of rapidly- changing regulations
- Water quality management in the future
- Potential legislative impacts on wastewater treatment
- Funding replacement of an aging wastewater management system infrastructure

The Wastewater Management Sub-element is one of six sub-elements that comprise the Environmental Management Element of the City's General Plan. The other sub-elements of the Environmental Management Element include:

-Surface Runoff
-Water Resources
-Air Quality
-Solid Waste
-Noise

The Surface Runoff Sub-element addresses the discharge of pollutants to creeks in South San Francisco Bay and the actions necessary to prevent flooding. The Solid Waste Sub-element provides guidelines for the source reduction, collection, recycling, and disposal of solid wastes. The Water Resources Sub-element discusses the four main sources of water in Sunnyvale, the regulatory outlook regarding water quality, the aging infrastructure, and water conservation. The Noise Sub-element describes ways to protect residents from excessive noise that can cause physical and mental health problems. The Air Quality Sub-element focuses on reducing air pollutant emissions from existing sources in Sunnyvale, as well as developing a policy framework to lessen the emissions associated with future development.

Information in this Wastewater Management Sub-element has been compiled from a number of sources, including the original 1983 Sanitary Sewer Sub-element, a March 2001 Sewer Rate Study by Bartle Wells Associates, CH2M Hill and EOA consultants, and various local and state agencies.

Wastewater Management Community Condition Indicators

		Actual 1997/98	Actual 1998/99	Actual 1999/00	Projected 2000/01
3.1.19	Miles of wastewater mains	327	327	327	327
3.1.20	Millions of gallons of liquid wastes treated per year	6,710	6,300	6,100	6,076
3.1.20	Average dry weather (May-October inclusive) liquid waste flow per day as a percentage of treatment plan design capacity	61.0	58.5	56.2	56.3
3.3.5	Water Pollution Control Plant energy consumption in B.T.U. per million gallons of wastes	105 Mil	105 Mil	105 Mil	105 Mil
3.3.6	Wastewater discharge permits	68	68	68	62

Regulatory Outlook

Initially, regulations were primarily concerned with measuring "conventional" pollutants such as suspended solids and biochemical oxygen demand (BOD), and the amount of debris which would ultimately deplete oxygen in waters. In 2001 the focus has shifted to "toxic" pollutants including metals such as mercury, copper, and nickel, volatile organics such as benzene, pesticides such as DDT and diazanon, and other trace organics such as PCBs, PAHs, and dioxins. These compounds occur in wastewater effluent at very low concentrations, typically measured in parts per billion for metals, and in parts per trillion (or less) for many of the organics.

California Toxics Rule and State Implementation Policy. The starting point for future effluent limits on toxic pollutants is the California Toxics Rule (CTR), enacted by the Environmental Protection Agency. The CTR sets down numerous criteria (water quality objectives) for 126 priority toxic chemicals identified in the Clean Water Act. These criteria are meant to protect both human health and aquatic life. The human health criteria are designed to minimize carcinogenic and non-carcinogenic risks. Aquatic life criteria were developed for fresh water and marine organisms, under both acute and chronic exposure conditions.

In March 2000, the State Water Resources Control Board adopted its Policy for Implementation of Toxic Standards for Inland Waters, Enclosed Bays, and Estuaries of California, also referred to as the State Implementation Policy (SIP). The SIP is designed to be used in tandem with the California Toxics Rule by regional boards in setting effluent limits and other National Pollutant Discharge Elimination System (NPDES) permitting actions, including the establishment of an effluent limit prior to completion of a Total Maximum Daily Load (TMDL). Ultimately, regional boards must revise their individual basin plans to conform with the California Toxics Rule, the State Implementation Policy, and with TMDL wasteload allocations.

Other Regulatory Developments. Although the California Toxics Rule and State Implementation Plan will have the greatest impact on future Water Pollution Control Plant NPDES permits, other developments likely to have an impact on the Sub-element include:

- Clean Water Enforcement and Pollution Prevention Act of 1999 – SB709 (State) This law (Water Code Sec. 13263.3) establishes mandatory minimum penalties for violations of NPDES permit effluent limits. SB709 has severely restricted the enforcement discretion of the Regional Water Quality Control Board for violations that have no significant impact on receiving water quality.

- Sanitary Sewer Overflow Rule (Federal) Included in the proposed rules is a program called Capacity, Management, Operations and Maintenance (CMOM). The basic requirements of CMOM are an overflow response plan, a management program, and periodic reports and audits.

- Biosolids (State, Federal) Concerns have been raised by the National Institute for Occupational Safety and Health regarding possible risks associated with biosolids applied to land. A comprehensive review by the National Academy of Sciences has been proposed. On the state level, significant resistance to land application of biosolids as a soil amendment has developed in parts of the Central Valley, which receives a large volume of "imported" biosolids.

- Prohibitions on Toxics The most effective tool in reducing the discharge of certain toxics may be a prohibition on their manufacture and/or use. Examples of existing prohibitions include Sunnyvale's ban on copper-based biocides in cooling towers, the ban in nine Bay Area counties on tributyltin and copper sulfate, the state-wide ban on the pesticide Diazanon, and the federal ban on most chlorinated pesticides and PCBs.

In summary, future developments in water quality regulation will be driven by concerns about the effects of toxic pollutants on the aquatic environment. These concerns will continue to impact NPDES permit effluent limits and other permit requirements. Water quality objectives for most of these compounds are extremely low - in some cases even below the measurement ability of analytical methods available in 2001. For some compounds, effluent limits derived from these criteria may not be attainable through the Water Pollution Control Plant's existing treatment process or source control efforts.

At the same time, the shift to a watershed management approach to water quality regulation promises greater flexibility in the process through which NPDES effluent limits are set. Through development of programs, TMDL, and other watershed-based stakeholder processes, the Water Pollution Control Plant has the opportunity to play an active role in the establishment of site-specific objectives and/or the allocation of pollutant loads. The South Bay copper/nickel TMDL effort has demonstrated that such a process can result in objectives that are protective of the environment and attainable by the Water Pollution Control Plant. The site-specific objective process can be costly, however, so commitment of adequate resources and alliances with other stakeholders is essential.

The shift to a watershed management approach will also compel further integration of the City's wastewater, surface runoff, and (to some extent) water resources sub-elements.

Flows

When the 1983 Sanitary Sewer Sub-element was prepared, Sunnyvale was growing rapidly and projections indicated continuing fast growth, with total flows approaching 35 million gallons per day (MGD). To safeguard the capacity of the collection system and the Water Pollution Control Plant, controls on development were put in place specifying how much additional flow would be allowed to connect to the system for each customer category.

In 2001, Sunnyvale is nearly fully developed. The City's Land Use / Transportation Sub-element states that almost 93% of the industrial parcels in the City are developed, and 96% of the parcels overall are developed. It is not anticipated that flows will exceed the capacity of the overall collection system or the permitted plant capacity of 29.5 MGD. Specific locations within the collection system, however, may require additional capacity.

The following table shows flow values, actual and projected, from the 1983 Sanitary Sewer Sub-element. Also included are those calculated in the 2001 Sewer Rate and Cost of Service Study conducted by Bartle Wells and Associates. Flows developed for this study were estimated for customer categories using water billing records and the estimated percentage of water purchased that reached the wastewater system. The flow values developed for the 1983 Sanitary Sewer Sub-element were based on land use/zoning and other factors that estimated sewage flow generation.

Estimated Wastewater Flows (all values in millions of gallons per day)			
	1983 Estimates		2001 Estimates
	Existing Flow	Projected Flow at Build-Out	Existing Flow
Residential	9.8	11.9	10.8
Industrial	9.1	13.4	2.0
Commercial	1.5	3.0	2.6
(I/I)			0.8
TOTAL	**20.4**	**28.3**	**16.2**

As stated, the two methods used to estimate flows in the table above are different, so the values are not directly comparable. In general, though, it can be seen that industrial flows have significantly decreased. This is the result of the changeover in local industry during the past 20 years from primarily manufacturing (including canneries) to knowledge-based industries. Potential future flows directly correlate to the types of industries that may come into the community in the future. A change in the prevalent type of industry, or just a few new large users, could have a significant impact on the total flow.

Discharge

The Sunnyvale Water Pollution Control Plant discharges to the southern portion of San Francisco Bay, via the lower extremity of the Santa Clara Valley Water District's Sunnyvale West Channel. It then flows to the Guadalupe and Sunnyvale Sloughs, and on into the bay.

The quality of effluent discharged by Sunnyvale, as well as by other neighboring cities, is substantially higher than national, federally-mandated secondary treatment standards. This is a necessity because of the characteristics of the receiving waters -- the sloughs and the southern end of San Francisco Bay. There is relatively little dilution available in the shallow waters of this part of the bay, and the narrowing of the bay near Dumbarton Bridge severely limits circulation of water from the north bay.

Reuse As Recycled Water

The Sunnyvale Water Recycling Program distributes recycled water within the City of Sunnyvale for irrigation of schools, parks, and golf courses, and groundwater recharge. The system could extend beyond the City limits to serve entities in Los Altos and Cupertino if economically feasible. The City is also a participant in a regional project to study cooperation between Bay Area recycled water producers, the delivery of recycled water across jurisdictional boundaries, and the prioritization of projects for state and federal grant funding.

By increasing the dosage of polymer applied in the air flotation tanks, along with a higher dosage of chlorine and longer contact times, the Water Pollution Control Plant is able to produce recycled water that meets all requirements for recycled water as specified in the California Code of Regulations Title 22 for Unrestricted Use.

The City of Sunnyvale is implementing the water recycling project in two phases. Phase I, in operation, is a pipeline that carries treated effluent from the Water Pollution Control Plant to serve Lockheed, Moffett Field Golf Course, and the Sunnyvale Golf Course. When completed, Phase II will use a series of pipelines to serve other parks and industrial areas in the north part of the City. The total potential average annual recycled water demand for both phases, including landscape irrigation, industrial, commercial, and government, is estimated at 3.5 MGD (0.7 MGD for Phase I and 2.8 MGD for Phase II).

The General Plan and Wastewater Management

Sunnyvale's General Plan is composed of seven elements: Transportation, Community Development, Environmental Management, Public Safety, Socio-Economic, Cultural, and Planning and Management. The Wastewater Management Sub-Element can be found under the Environmental Management element of the General Plan.

Management of the Wastewater System and Economic Development

Availability of adequate wastewater processing capacity is of critical importance to a variety of industries in Santa Clara Valley, ranging from the fabrication of silicon chips to various irrigation uses. As growth in population continues, businesses are becoming more sensitive to issues of water availability, utility rates and other development related fees when deciding on a location for their operations.

The Wastewater Management Fund

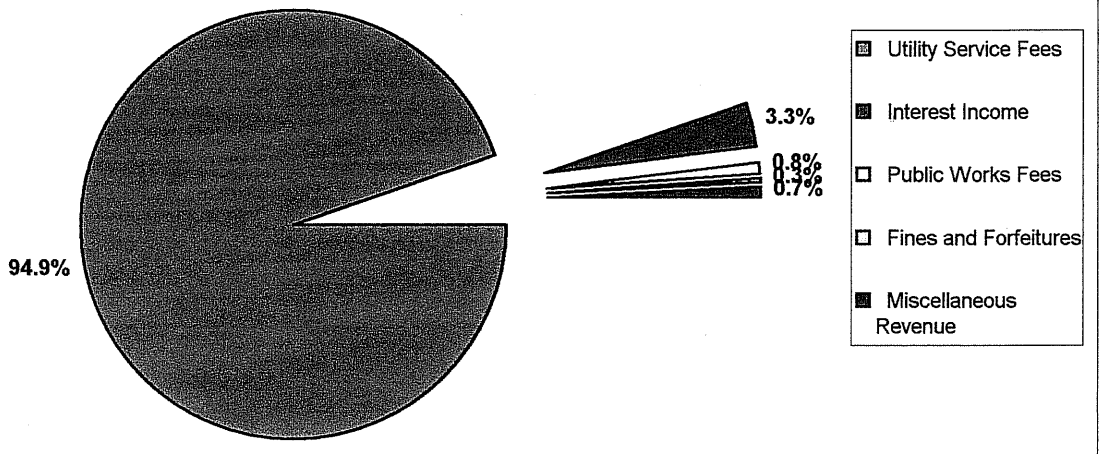
The Wastewater Management Fund is one of five utility funds (others are the Water Supply and Distribution Fund, Solid Waste Management Fund, SMaRT Station® Equipment Replacement Fund, and SMaRT Station® Operating Fund) which make up the City's Combined Utility Fund. The Combined Utility Fund maintains balances that are adequate to fund operating service levels, contingencies, and capital improvements over a 20-year time frame.

Sunnyvale provides wastewater management services as a municipal utility. Costs for collection, treatment, and discharge of wastewater are all included in the Wastewater Management Program Budget. The budget for the wastewater management system is developed and approved along with the entire City budget. Capital projects are budgeted as part of the City's Capital Improvement Program.

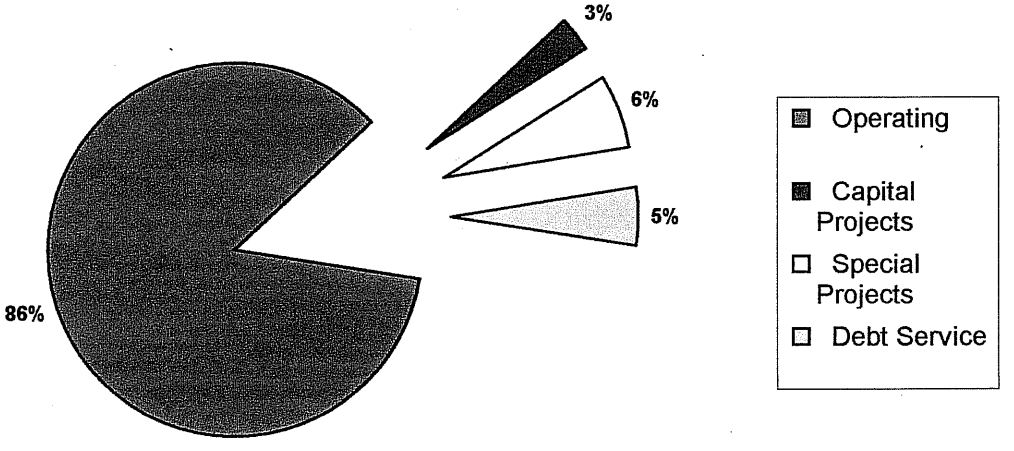
The City is in the process of developing a comprehensive infrastructure management plan that will document the life expectancy and replacement costs for all portions of the wastewater management system as well as all other City-owned and operated facilities. This plan will develop life schedules likely to be in the 50-100 year range that will allow for a comprehensive funding of replacement of infrastructure over a long period of time. The schedule that will be developed for the infrastructure management plan will be reviewed annually and any changes to the type of equipment or the schedule for replacement will be approved in advance by the City Council as part of the yearly budget process.

The graphs on the following page illustrate the budgeted 2001-2002 Wastewater Management Fund expenses and revenues.

Wastewater Management Fund Revenues FY00-01



Wastewater Management Fund Expenses FY00-01



Wastewater Rates

The City provides wastewater management service to 56,404 customers, including: 23,650 single family residences, 30,861 multi-family units (1.638 accounts), 1,852 commercial customers, 41 significant industrial users and NASA. Most of these customers are located within city limits. However, one commercial enterprise, 1,864 single family residences, and two multi-family buildings are located outside the city.

City of Sunnyvale wastewater utility rates are based entirely on the City's costs for operating and maintaining its wastewater facilities and services. The wastewater system is operated as an independent enterprise and all expenses and revenues are accounted for separately. It is important to note that the practice of long term planning and the use of a rate stabilization fund have enabled the City of Sunnyvale to maintain wastewater rates at the lowest possible level by spreading the effects of anticipated operational and infrastructure costs over 20 years.

Comparison of wastewater rates in March 2001
Sunnyvale and neighboring cities

City	Average Residential Bill Per Month*
Palo Alto	$18.25
Los Altos	$12.00
San Jose	$22.33
Mountain View	$12.82
Sunnyvale	$16.92
Santa Clara	$7.85
Milpitas	$21.15
Cupertino	$19.00
Gilroy	$29.16
Morgan Hill	$32.57

*Assumes single family monthly rate. From the Sunnyvale Department of Finance

Periodically, the City reviews the methodology used to calculate the wastewater rates to ensure that the rates reflect actual cost. A cost of service study was done in Fiscal Year 2000-2001 that included an independent analysis of the City's wastewater rate structure, connection fees, and long range finances for the wastewater enterprise. The study revised estimates for flows and treatment parameters and recommended adjustments to the wastewater rate structure to ensure costs are recovered on a equitable basis from the different customer classes.

The study also concluded that wastewater rates should be designed to generate sufficient revenue to ensure financial health and stability of the utility, taking into account both

ongoing operating needs and capital improvements. The City adopted the following guidelines in setting the new wastewater rate structure for Fiscal Year 2001-2002:

- All customers should pay a proportional share of system operating and maintenance costs.
- Each customer should be charged a rate based on the cost of providing service to that customer.
- Rates for customers with similar characteristics should be consistent.
- Total operating revenues should be sufficient to pay all costs related to system operation and maintenance, as well as administrative and debt service.
- The rates should include a provision for replacement of system facilities and infrastructure.
- The rates should comply with commitments to bondholders or other lenders.

Current Rates

Residential customers are charged a fixed bi-monthly rate for wastewater service. Single family residences currently pay a bi-monthly rate of $33.83. Owners of buildings with multi-family residential units are charged $20.94 per unit regardless of whether each unit is occupied or vacant. Rates were last adjusted by 5.5% on July 1, 2001.

The current rate structure segregates commercial customer into three classifications based on sewage strength: 1) Low Strength; 2) Standard Strength; and 3) High Strength. Standard Strength Commercial customers are charged $1.6458 per ccf of metered water use each month for wastewater service. The rate for low strength customers is $1.4665 per ccf of water use. High strength customers (e.g. restaurants) are charged $3.6187 per ccf.

Significant industrial users are also billed monthly based on metered water use. Their rate is determined based on actual yearly sampling data that focuses on flow, discharge of suspended solids, discharge of total organic carbon, and discharge of ammonia nitrogen. The City has a separate contract with NASA. NASA is charged the standard commercial rate for wastewater management service.

Goals, Policies, and Action Statements

Goal 3.3A Ensure that the quantity and composition of wastewater generated in the City does not exceed the capabilities of the wastewater collection system and Water Pollution Control Plant.

Policy

3.3A.1 Water Pollution Control Plant improvements should be designed, constructed and maintained and the quantity of industrial wastes should be controlled so that the plant does not have to be expanded in excess of its capacity of 29.5 MGD.

Action Statements

3.3A.1a Monitor the generation of industrial wastes by new industries and enlargements of existing industries to ensure that the safe treatment capacity is not exceeded at any time.

3.3A.1b If the average flow reaches 75% of design flow, review projected flows and existing plant capacity to determine the advisability of imposing a wastewater discharge moratorium.

3.3A.1c Maintain a fair and equitable allocation system of Water Pollution Control Plant treatment capacity to land use categories.

Policy

3.3A.2 Ensure that wastes discharged to the wastewater collection system can be treated by existing treatment processes of the Water Pollution Control Plant.

Action Statements

3.3A.2a Provide adequate pretreatment monitoring to ensure that discharge standards are met by the discharger community.

3.3A.2b Maintain an active information program to inform wastewater management users of prohibited discharges, pretreatment methods, and reporting requirements.

Goal 3.3B Continue to operate and maintain the wastewater collection system so that all sewage and industrial wastes generated within the City are collected and conveyed under safe and sanitary conditions to the Water Pollution Control Plant.

Policy

3.3B.1 Inspect critical points in the wastewater management system annually to ensure that the proper level of maintenance is being provided and that the flow in sewers does not exceed design capacity.

Action Statements

3.3B.1a. Jet flush the wastewater collection system on a regular basis.

3.3B.1b. Monitor locations where the capacity is critical in the wastewater collection system.

3.3B.1c. Continue the program of minimizing illegal storm connections on private property to the City wastewater collection system.

3.3B.1d. Continue the program of locating and correcting points of infiltration in the wastewater management system.

3.3B.1e. Continue to provide an optimum level of maintenance to the wastewater management system.

3.3B.1f. Develop and maintain accurate, up-to-date maps and records of the wastewater management system.

3.3B.1g. Ensure that the City's 50-year infrastructure plan provides for necessary capital improvements and replacements.

Goal 3.3C Continue to operate and maintain the Water Pollution Control Plant, using cost effective methods, so that all sewage and industrial wastes generated within the City receive sufficient treatment to meet the effluent discharge and receiving water standards of regulatory agencies.

Policy

3.3C.1 Monitor Water Pollution Control Plant operations and maintenance to meet regulatory standards.

Action Statement

3.3C1a. Continue to provide water pollution control facilities, personnel, materials and utilities so that sewage and industrial waste generated within the City can be treated to meet the regulatory standards.

Policy

3.3C.2 Coordinate operating procedures with the City energy policy to optimize an alternative energy program so that minimum use and reliance are placed on outside energy sources.

Action Statements

3.3C.2a Maximize production and use of landfill gas for power production.

3.3C2b. Maximize production and use of digester gas for power production.

3.3C2c. Implement necessary changes to allow power production with use of landfill, digester, or natural gas, or a combination of any of the three.

Policy

3.3C.3 Actively participate in the watershed management approach to solving water quality issues of the Santa Clara Basin Watershed and the South Bay

Action Statement

3.3C.3a Continue to work with neighboring cities, state and federal agencies, and through the Watershed Management Initiative, to solve mutual water quality problems.

3.3C.3b. Support the development of environmental regulations that have a sound scientific basis and allow for reasonable implementation.

Policy

3.3C.4 Produce quality recycled water and seek to maximize the use of this resource.

Action Statements

3.3C.4a. Produce recycled water, fulfilling California Code of Regulations Title 22 water quality standards, to meet the demand of recycled water customers.

3.3C.4b Maximize the efficiency of recycled water production and distribution.

3.3C.4c Market recycled water to potential new customers and maximize the use of recycled water within existing distribution area.

3.3C.4d. Annually review the usage of recycled water and the feasibility of expanding its use and distribution.

3.3C4e. Monitor effects of water reuse and its relationship on discharge to San Francisco Bay.

3.3C4f. Study feasibility of recycled water for restoration and/or enhancement of marshlands.

Goal 3.3D Maintain a financially-stable wastewater management fund through a user-based fee system.

Policy

3.3D.1 Assess connection fees to new system users to recoup the costs of excess system capacity constructed for their eventual use.

3.3D.2 Assess user fees based on quantity and composition of wastewater generated

3.3D.3 Establish appropriate reserves to ensure reliable rates and to provide capital improvements and infrastructure replacement needs.

3.3D.4 Annually review the wastewater rate structure.

3.3D.5 Bi-annually review the 50-year plan for capital improvement and replacement needs

3.3D.6 Continue to make landowners responsible for maintenance of sewer laterals, with the exception that the City will make repairs to laterals between property line and sewer mains caused by broken pipes and street tree roots.

3.3D.7 Properties outside the City limit that are served by the Sunnyvale wastewater collection system shall pay the full cost of wastewater management service. In addition to a higher rate for such special service, outside customers should also pay all costs for special maintenance and necessary repairs. This includes the use of outside plumbers, delivery of service at call back times, any expenses to the City of Sunnyvale from other jurisdictions connected to the provision of service (i.e. franchise fees), and costs for improvements to the system.

3.3D.8 Explore agreements with neighboring cities where the Water Pollution Control Plant would treat interjurisdictional wastewater for a fee as long as these agreements: 1) create no capacity issues 2) do not hinder future development and 3) are economically advantageous.

HISTORY OF SUNNYVALE'S WASTEWATER MANAGEMENT SYSTEM

Sunnyvale was incorporated as a city in 1912. An engineering study that same year concluded that a wastewater management system should be installed and that treatment and disposal of the sewage collected should be by dilution in the waters of the Guadalupe Slough and South San Francisco Bay. The engineer calculated that there was ample dilution water in the slough and Bay to handle the small amount of sewage generated by residents and businesses in the City. The first sewers and outfall in Sunnyvale were installed shortly thereafter.

Through its early years, Sunnyvale was an agricultural community. In the 1940s it developed into an important residential and industrial city. Population grew from about 3,000 in 1930 to 10,000 in 1950. An engineering study in 1951 determined that the City was then in need of a city-wide sewage treatment system and plans were begun to accomplish this. Just two years later the Regional Water Quality Control Board (RWQCB) issued requirements which prohibited discharges into the Bay or its tributaries which caused:

(1) grease, scum or any other floating material of sewage or industrial waste origin;
(2) formation of sludge deposits;
(3) odors of sewage or industrial waste origin;
(4) toxic concentrations of substances deleterious to fish or wildlife; or
(5) the dissolved oxygen content in the surface water of Guadalupe Slough to be less than 0.5 parts per million.

The original master plan envisioned an ultimate plant capacity of 30 million gallons per day (MGD), with expansions taking place in 7.5 MGD increments. Accordingly, the first primary water treatment plant, completed in 1956, had a capacity of 7.5 million gallons per day (MGD). This plant included three sedimentation tanks, two anaerobic digesters, and holding ponds (lagoons) for the digested sludge. In 1958, a holding pond for industrial wastes was completed which covered 115 acres and held 200 million gallons. These new facilities allowed the City to comply with RWQCB regulations, but as the City grew, it became more difficult to meet the condition specifying the dissolved oxygen content in the surface water of the Guadalupe Slough.

By 1960, the population of Sunnyvale had surpassed 50,000. Another engineering study that year showed the need to immediately double, and ultimately to quadruple, the capacity of primary treatment. The study also reported that secondary treatment facilities were urgently needed.

Additions doubling the capacity of primary treatment to 15 MGD were completed in 1962. This project added a third digester and three more sedimentation tanks.

By 1965, the City had again outgrown its treatment facilities and was unable to meet the RWQCB requirements, particularly during the peak cannery seasons when large volumes of high strength wastes had to be treated. Secondary (biological) treatment was initiated with the completion of a 325-acre oxidation pond in 1968. This did not completely solve the problem, however, because cannery wastes flowed directly to the industrial holding pond for further natural reduction before discharge into the slough.

As another engineering study was being completed in 1969, the RWQCB again raised treatment standards regarding discharge to the Bay. These additional standards required that (1) the dissolved oxygen in Guadalupe Slough be no less than 5.0 mg/l and (2) toxicity be such that test fishes be able to live for 96 hours in the undiluted waste. The City was notified that it would have to meet the new requirements as soon as possible.

Sunnyvale citizens realized the seriousness of this situation and voted overwhelming support in 1969 for a $3,290,000 revenue bond issue to finance the needed improvements. At this time, the sewage treatment plant was named the Donald M. Somers Water Pollution Control Plant to honor a former Director of Public Works.

In 1973, improvements were completed which increased the capacity of the primary and secondary facilities from 15 MGD to 22.5 MGD. Work included construction of three additional primary sedimentation tanks, a fourth digester, expansion of the power building, and installation of aerators (2,200 horsepower total) in the oxidation ponds. The industrial waste holding pond was incorporated into the oxidation pond system, and, thereafter, cannery wastes received full treatment.

But even before this expansion was completed, the regulatory agencies substantially raised standards for treatment and discharge. The new standards included a reduction in the allowable levels of effluent BOD and suspended solids to 10 mg/l monthly average for each, a chlorine residual limit of zero, and a receiving water ammonia limit. Meeting the stricter limits required construction of additional (tertiary) treatment facilities. The City obtained federal and state grants covering 87% of the costs for this construction. An environmental impact report was prepared and accepted, and pilot studies were conducted to provide design criteria for the new unit processes.

The tertiary facilities were placed in operation in May of 1978, consisting of: (1) dissolved air flotation units to remove algae from the oxidation pond effluent; (2) fixed growth reactors to convert ammonia to nitrite and nitrate; (3) dual media filters to remove

any remaining suspended solids; and (4) chlorination and dechlorination facilities. The tertiary facilities were designed for 22.5 MGD, with provision for future expansion to 30 MGD. A Tertiary Control Building was also constructed to serve as the control center for the new tertiary processes and to house a new laboratory.

A primary plant expansion project in 1984 included construction of the 10th primary sedimentation tank, the (influent) auxiliary pumping station, grit & screenings dewatering equipment, a maintenance wing on the control building, and a new administration building. The tertiary plant was also expanded in 1984, with construction of a fourth air floatation tank and fourth chlorine contact tank and improvements to the Water Pollution Control Plant's control systems, including the introduction of a centralized computer-based operator's station. With these changes, the 29.5 MGD plant capacity was achieved.

The trend toward increasingly stringent effluent limitations continued, with the focus in the late 1980s shifting from "conventional" pollutants to metals and other toxic pollutants. The challenge was met without new construction at the Water Pollution Control Plant by optimizing plant operations (e.g. use of improved coagulants at the air flotation tanks) and through enhanced source control and pretreatment by industrial discharge which are regulated through the Water Pollution Control Plant's Industrial Waste Program.

Sludge from the anaerobic digesters had historically been stored in two sludge lagoons. In 1994, a sludge dewatering facility was constructed, featuring 16,200 square feet of gravity drainage filter panels and a paved final drying area. Digested sludge is now hauled off site for placement in the City's sludge monofill, or is beneficially reused as landfill cover material or agricultural soil amendment.

In the early 1990s, the City initiated the design of facilities to recycle water produced by the Water Pollution Control Plant for landscape irrigation, industrial processes, and other approved purposes. The City's commitment to water recycling is driven, in part, by the Water Pollution Control Plant's National Pollutant Discharge Elimination System (NPDES) Permit which requires that the City take actions to maximize recycling and minimize the effluent discharge. A 4 MGD recycled water pump station was constructed at the Water Pollution Control Plant in 1993, and expanded to 8 MGD in 2000. Recent improvements to the Water Pollution Control Plant's polymer delivery system, chlorine contact tanks, and tertiary plant control systems facilitate production of the highest quality "disinfected tertiary" recycled water.

The City's recycled water distribution system includes nearly 75,000 feet of pipelines, a second pump station, and a two million gallon storage tank. In 2001, the system served more than 50 public and private facilities in northern Sunnyvale, with potential for expanding throughout the City and beyond.

The second half of the 1990s also saw the construction of the Toxic Gas Storage and Handling Facilities (for chlorination and dechlorination gasses), upgrading of plant

control systems, and construction of a new Power Generation Facility. With modifications underway in 2001, that system will have the capability to utilize gas from three sources (biogas from the Water Pollution Control Plant's digesters, biogas from the former Sunnyvale landfill, or purchased natural gas) to produce electrical power for use at the Water Pollution Control Plant or for off-site sale.

Sunnyvale's canneries ceased operations in the early 1980s, as the City's economic base completed its shift from an agricultural to an industrial/commercial base. Water Pollution Control Plant influent flows declined slightly during the latter half of the 1980s, and dropped to a low of approximately 13 MGD (annual average) during the drought years of the early 1990s. During the mid to late 1990s, flows gradually increased to pre-drought levels (approximately 16 MGD), but were still below the levels of the early 1980s. However, during the wettest months, the tertiary plant often operates at flows in the 20 - 24 MGD range.

The Water Pollution Control Plant's Pretreatment Section is responsible for enforcement of federal "Pretreatment" regulations, which apply to certain industrial dischargers, and of the City's own "local limits" specified in the City's wastewater ordinance. In this capacity, the Pretreatment Program regulates approximately 70 industrial users and approximately 1,800 other commercial and industrial dischargers.

WASTEWATER MANAGEMENT COMMUNITY CONDITION INDICATORS

		Actual 1997/98	Actual 1998/99	Actual 1999/00	Projected 2000/01
3.1.19	Miles of wastewater mains	327	327	327	327
3.1.20	Millions of gallons of liquid wastes treated per year	6,710	6,300	6,100	6,076
3.1.20	Average dry weather (May-October inclusive) liquid waste flow per day as a percentage of treatment plan design capacity	61.0	58.5	56.2	56.3
3.3.5	Water Pollution Control Plant energy consumption in B.T.U. per million gallons of wastes	105 Mil	105 Mil	105 Mil	105 Mil
3.3.6	Wastewater discharge permits	68	68	68	62

REGULATORY OUTLOOK

Regulatory developments at the national, state, and local levels will continue to demand the City's close attention. These developments will impact future National Pollutant Discharge Elimination System (NPDES) permit requirements and other components of the Wastewater Management Sub-element.

The 2001 regulatory focus in water quality has largely shifted from "conventional" pollutants (BOD, suspended solids, etc) to "toxic" pollutants. The toxics include metals such as mercury, copper, and nickel, volatile organics such as benzene, pesticides such as DDT and diazanon, and other "trace" organics such as PCBs, PAHs, and dioxins. These compounds occur in wastewater effluent at very low concentrations, typically measured in parts per billion for metals, and in parts per trillion (or less) for many of the organics. Water quality standards for these materials are based on observed toxicity to aquatic life in laboratory tests, or on the projected impacts to human health resulting from direct ingestion and/or consumption of shellfish.

With the focus on toxics has come the understanding that historic "technology-based" approach for regulating water quality, which relied upon controlling point sources (industrial dischargers and the publicly-owned treatment works to which they discharge) will not necessarily achieve the desired water quality objectives. This is largely because point sources, in many cases, constitute only a small fraction of the receiving water's overall pollutant loading. Though not evoked until recently, the 1972 Clean Water Act (CWA) identified a second "water quality" based regulatory approach. This approach establishes the maximum pollutant "load" which the water body can assimilate on a daily basis without violating water quality standards. In theory, the resulting Total Maximum Daily Load, or TMDL (which includes an appropriate safety factor), is then allocated among all sources of that pollutant, not only point sources such as publicly-owned treatment works. The "water quality" based approach to regulating pollutants will impact both the wastewater management and surface runoff sub-elements, since both publicly-owned treatment works and urban runoff provide a means by which some pollutants are conveyed to the receiving water.[1]

Like other publicly-owned treatment works (POTW), the Water Pollution Control Plant was designed to remove conventional pollutants from the influent wastewater stream. The removal of toxic pollutants is largely incidental to this function, although a well-operated plant will effectively remove a significant percentage of toxic pollutants present in the influent stream. Efforts to measure the effectiveness of publicly-owned treatment works in removing toxics (in particular mercury and trace organics) have historically been limited by the inability of analytical methods to detect these compounds at the low

[1] Although POTW effluents and stormwater flows are typically characterized as "sources" of pollutants, it is more accurate to view them as a means of conveyance from the actual sources.

levels typically present in wastewater. However, advances in analytical chemistry are steadily increasing the sophistication of detection. The combination of these two forces -- an increased regulatory focus on toxics and advances in analytical chemistry -- is driving the development of a whole new tier of compliance requirements for publicly-owned treatment works.

The other means by which a POTW can control toxics in the effluent is through an aggressive source control program which seeks to prevent toxics from entering the wastewater stream in the first place. Traditional source control efforts focused on industrial dischargers (e.g. metal finishers, electroplaters, etc) whose discharge was known to contain toxic materials. During the past decade, the publicly-owned treatment works in the South Bay took a lead role in expanding those efforts to include certain categories of commercial dischargers (e.g. photoprocessors, automotive shops, printers). While important, these efforts are still relatively ineffectual for most of the "trace" toxics whose sources are highly diffuse and could include industrial activities that ceased decades ago, deposition from the atmosphere, or consumer products used by thousands of residential wastewater discharges. The Water Pollution Control Plant's Environmental Outreach Program is designed to address some of these diffuse sources.

California Toxics Rule and State Implementation Policy

The starting point for future NPDES effluent limits on toxic pollutants is the California Toxics Rule (CTR) recently enacted by EPA. The CTR includes numeric criteria (water quality objectives designed to protect both human health and aquatic life) for 126 priority toxic chemicals identified in the Clean Water Act (CWA). The human health criteria reflect both carcinogenic and non-carcinogenic risks. Aquatic life criteria were developed for fresh water and marine organisms under both acute and chronic exposure conditions. In this way, a given pollutant may have up to six different criteria. The appropriate criteria, as determined by the water body's designated beneficial uses, are used to determine if the water body is "impaired" for that pollutant. (Other factors, such as the presence of fishing, water, swimming advisories, can also lead to a water body being identified as impaired).

Impaired water bodies are prioritized according to the severity of the pollution and uses. The prioritized listing of water bodies is referred to as a "303(d) list" in reference to that section of the Clean Water Act. In California, more than 500 water bodies are listed for one or more pollutants. (A water body may be listed on the basis of other types of pollutants, such as sediment, nutrients, bacteria, low dissolved oxygen, trash). The CWA requires that 303(d) lists be updated every two years. States must establish total maximum daily loads (TMDL) for all listed water bodies.

The large number of TMDLs required, compounded in some cases by the lack of reliable data and limited State resources allocated for TMDL development, will result in a process

extending over many years. For publicly-owned treatment works, the TMDL process will result in a wasteload allocation which will serve as the basis for NPDES permit effluent limits. In the absence of a TMDL, regional boards will establish effluent limits from water quality objectives based on other policies.

In March 2000, the State Water Resources Control Board adopted its Policy for Implementation of Toxic Standards for Inland Waters, Enclosed Bays, and Estuaries of California, also referred to as the State Implementation Policy (SIP). The SIP is designed to be used by regional boards in tandem with the California Toxics Rule in setting effluent limits and other NPDES permitting actions, including establishment of an effluent limit prior to completion of a TMDL. Ultimately, regional boards must revise their individual Basin Plans to conform with the CTR and SIP, and with TMDL wasteload allocations.

The SIP establishes a framework for translating California Toxics Rule criteria into NPDES permits and wasteload allocations, specifies monitoring requirements for dioxins, and establishes chronic toxicity testing and control requirements. If sufficient effluent and/or receiving water data are not available for a given pollutant, the SIP directs regional boards to establish interim requirements, and to require additional monitoring. The SIP also provides guidance for developing site specific objectives for cases where statewide criteria are deemed overly or under protective of designated uses. Sunnyvale, San Jose and Palo Alto are conducting such a study in 2001 to develop site-specific objectives for copper and nickel, as described below.

Other Regulatory Developments

Although the California Toxics Rule and State Implementation Policy will have the greatest impact on future Water Pollution Control Plant NPDES permits, other developments likely to have an impact on the sub-element include:

- Clean Water Enforcement and Pollution Prevention Act of 1999 – SB709 (State) This law (Water Code Sec. 13263.3) establishes mandatory minimum penalties for violations of NPDES permit effluent limits. SB709 has severely restricted Regional Water Quality Control Board enforcement discretion for violations that have no significant impact on receiving water quality.

- Sanitary Sewer Overflow Rule (Federal). Included in the proposed rules is a program called Capacity, Management, Operations and Maintenance (CMOM). The basic requirements of CMOM are an overflow response plan, a management program, and periodic reports and audits.

- Biosolids (State, Federal) Concerns have been raised by National Institute for Occupational Safety and Health (NIOSH) regarding possible risks associated with

biosolids applied to land. A comprehensive review by the National Academy of Sciences has been proposed. On the state level, significant resistance to land application of biosolids as a soil amendment has developed in parts of the Central Valley which receives a large volume of "imported" biosolids.

- Prohibitions on Toxics The most effective tool in reducing the discharge of certain toxics may be a prohibition on their manufacture and/or use. Examples of existing prohibitions include Sunnyvale's ban on copper-based biocides in cooling towers, the ban in nine Bay Area counties on tributyltin and copper sulfate, the statewide ban on the pesticide Diazanon, and the federal ban on most chlorinated pesticides and PCBs.

Watershed Management Approach

The State Implementation Policy explicitly recognizes the "watershed management" approach to water quality management and TMDL development. The SIP describes watershed management as: "an integrated holistic approach for restoring and protecting aquatic ecosystems and protecting human health in a geographic area. Watershed management may include diverse issues as defined by the watershed's stakeholders (persons with some interest in the watershed) to ensure comprehensive solutions. It reflects a growing consensus that many of the existing water quality problems can best be addressed by a more integrated, basin-wide approach. The purpose of watershed management is variously viewed as (1) a method for increasing participation at the local level in water quality protection, (2) an approach to reducing the impact of non-point sources, (3) a strategy for integrating management of all components of aquatic ecosystems, and (4) a process for optimizing the cost effectiveness of a blend of point and nonpoint source control efforts."

The Santa Clara Basin Watershed Management Initiative (WMI) provides a local example of this new approach. The WMI was established to coordinate regulatory activities on a basin-wide scale. Participants include federal, state, and local regulatory agencies, municipalities and other public agencies, business and trade associations, environmental and civic groups. Although the goals of the WMI reflect a much broader perspective, it has provided a framework to address specific issues which will impact NPDES permits of the three South Bay publicly-owned treatment works (Sunnyvale, Palo Alto, and San Jose). For example, the WMI's Bay Modeling and Monitoring Subgroup has taken the lead in addressing water quality issues that impact the South Bay, and has been tasked with developing a copper and nickel TMDL. To guide that effort, the Subgroup designed an innovative TMDL Process Decision Diagram which provides a roadmap for the process with "escape points" from conducting a full TMDL if attainment with newly-developed water quality objectives can be demonstrated. Through rigorous scientific studies and a broad-based stakeholder process, the Subgroup went on

to develop a range of scientifically defensible, site-specific objectives for copper and nickel, and demonstrated that attainment with these objectives was likely.

The Regional Water Quality Control Board has adopted a stakeholder approach for other TMDLs in progress in 2001 (mercury and PCBs). A similar effort is underway to develop copper and nickel site specific objectives for the remainder of San Francisco Bay, and it can be expected that the South Bay model will be employed for other pollutants, even where TMDLs may not be required.

To publicly-owned treatment works, a regulatory approach based on principles of watershed management and stakeholder involvement offers an attractive alternative to the historic "command and control" regulatory approach. However, the new approach will not automatically guarantee a fair allocation of pollutant loads, especially when overall loading reductions are required to ensure that water quality objectives are met. This is because the NPDES permit holders (wastewater and stormwater) are highly regulated, whereas many of the other pollutant sources are either unregulated or do not fall under the jurisdiction of the Environmental Protection Agency or the Regional Water Quality Control Board. Therefore, the City will need to continue a policy of active stakeholder involvement in these processes and an adequate commitment of resources to ensure that Sunnyvale's interests are protected

WASTEWATER COLLECTION SYSTEM

Sunnyvale's wastewater collection system has the capacity to convey all sewage and industrial wastes generated when the City is fully developed in accordance with the Land Use Sub-element. Five major trunk networks terminate at the Water Pollution Control Plant (WPCP), referred to as the Lawrence, Borregas, Lockheed, Moffett and Cannery trunks. On the following page is a map showing drainage area boundaries for the areas served by the five collection networks.

The total carrying capacity of the collection system is 55.7 MGD as it enters the Water Pollution Control Plant. While this exceeds the average dry weather capacity of the WPCP, the lines are not likely to ever actually all flow full at the same time, and some will probably never flow to their full capacity. Capacities of individual networks are:

Lawrence	22.0	MGD
Borregas	17.0	MGD
Cannery	5.5	MGD
Lockheed	4.9	MGD
Moffett Field	6.3	MGD
TOTAL	55.7	MGD

The potential for high flows in the Lawrence trunk have been mitigated by two flow diversions recently installed. About 4.2 MGD of sewage can be pumped from the Lawrence sewer (at the Arques Lift Station) to the Borregas sewer during peak flow periods. A diversion system has been constructed to handle the peak but only operates when the flows reach a certain level, preventing any overloading of the Lawrence trunk.

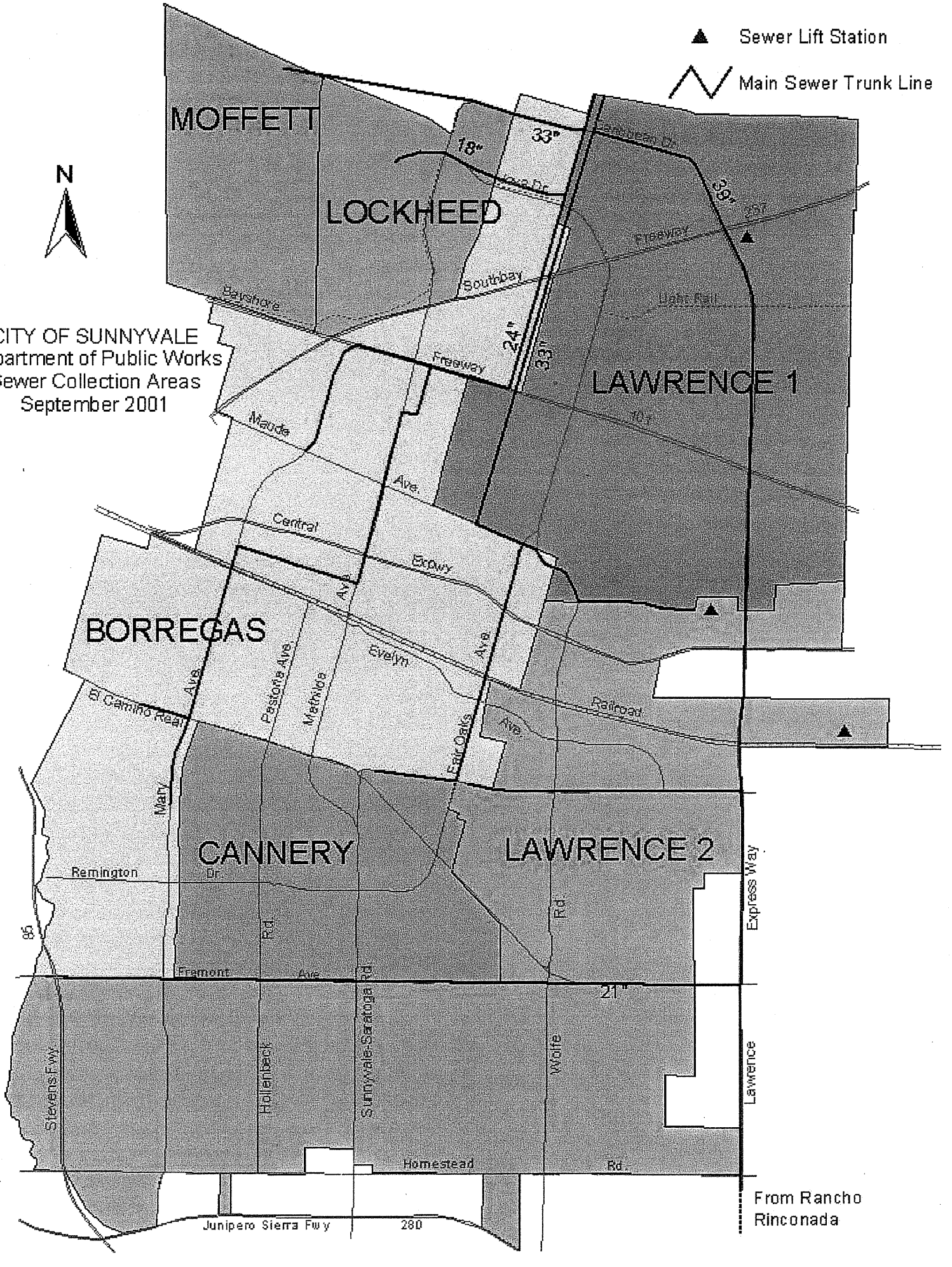
A second diversion makes use of the Cannery sewer. When initially constructed, the Cannery line served only the two canneries that operated in Sunnyvale at that time. When the canneries closed in the late 1970s, this line was converted to a storm sewer. In 1998, the Cannery line was returned to sanitary sewer conveyance. A weir was constructed in a manhole at the intersection of Fair Oaks Avenue and Old San Francisco Road to divert the flow of an 18 inch sewer into the Cannery line running north on Fair Oaks and away from the Lawrence system.

Wastewater Connections

Every structure or property used for human occupation, employment, recreation, food services, etc. within the City is required to have suitable toilet facilities and be directly

connected to a public sewer in order to ensure that wastes generated are properly treated and disposed. If a residential, industrial or commercial use is found to be serviced by a septic tank or cesspool, the City gives notice that the owner must connect to a pubic sewer within 90 days. (Existing buildings annexed from county "island" areas are exempt from this requirement.) A connection fee is charged to recover a pro rata share of capital construction costs with the owner paying full costs of the sewer lateral installation.

The City has extended wastewater management service into several former county island areas. In addition, the City serves the Rancho Rinconada area that is located south of Stevens Creek Boulevard and west of Lawrence Expressway. Most of this area has been recently annexed by the City of Cupertino, with a small portion of it in the City of San Jose. No portion of it remains as unincorporated County land. The area is being reviewed for possible jurisdiction revision to allow for service through the Cupertino Sanitary District. However, capacity and historic practices may require that Sunnyvale continue to be the wastewater management service provider for this area. Altogether, the total population serviced outside of Sunnyvale city limits is estimated at 8,000.


Sewer Lift Station
Main Sewer Trunk Line
N
MOFFETT
LOCKHEED
LAWRENCE 1
BORREGAS
CANNERY
LAWRENCE 2
CITY OF SUNNYVALE
Department of Public Works
Sewer Collection Areas
September 2001
18"
33"
39"
24"
33"
Freeway
Southbay
Maude
Ave.
Central
Expwy
Evelyn
Ave
El Camino Real
Pastoma Ave
Mathilda
Fair Oaks
Railroad
Mary
Remington
Dr.
Fremont
Ave.
Rd.
Wolfe
Express Way
Lawrence
Stevens Fwy
Hollenback
Sunnyvale-Saratoga Rd
Homestead
Junipero Sierra Fwy
280
85
21"
From Rancho
Rinconada

Maintenance and Repairs

As sanitary sewers become older, gaps from cracks, joints, aging gaskets and leaking services tend to allow some groundwater or rainwater to enter the system. This process is called infiltration. The gaps may be the result of normal aging, improper construction, or possibly from light displacement due to earth movement or minor earthquakes. A certain amount of rainwater may also find its way into the wastewater system as inflow. This can result from direct connections of storm drains or downspouts to the wastewater system, either in the right-of-way or on private property.

Infiltration and inflow can interfere with the needed capacity of sanitary sewers and the Water Pollution Control Plant. Though virtually impossible to eliminate altogether, maintenance crews use closed circuit video inspection to monitor for bad joints and/or broken pipes which allow infiltration. Private industry is also checked for illegal storm drain cross-connections to ensure that the quantity of rainfall that flows to the Water Pollution Control Plant is kept under control. If infiltration and inflow are allowed to continue, unnecessary additional wastewater and treatment plant capacity would have to be constructed and costly treatment provided for the water.

City crews maintain the operation of the sewer main lines by regular flushing and repairing easily-accessible parts of the system. Areas of known grease or dirt accumulation are flushed regularly. Depending upon the degree of build-up, the frequency may vary from several weeks to several months.

When blockages are the result of root intrusion, City crews cut and remove the blocking root and treat the area with a commercially-available foam to slow future root growth. Due to the expense of excavation and working around other utilities, replacement of the impacted line is not generally the remedy unless the situation cannot be resolved by other means. When possible, trenchless techniques of "slip-lining" or "pipe bursting" are used to avoid the costs and inconveniences of removing and replacing wastewater lines.

The City maintains nine siphons within the system of sewers, eight of which are "double-barrel" siphons to protect against sudden failure and back-up in hard-to-repair locations. These are also flushed periodically. Manholes are inspected when possible and checked for any needed repairs such as loose steps, leaks, or broken rings.

Maintenance of service laterals to homes is generally the responsibility of the individual homeowner or resident. The property owner is responsible for seeing that blockages do not occur due to the disposal of inappropriate materials through the wastewater system. If the problem in a service lateral is identified as being from the intrusion of roots from City street trees into the pipe, then the City will clean or repair the problem.

Several methods are available to gain access to this hard-to-maintain area:

- Install clean-outs at the property line
- Install clean-outs at the house where the lateral is not as deep and allows for clearing whether the blockage is in the right-of-way or between the property line and the house
- Replace sections of laterals, or the entire lateral, if damage caused by root intrusion is too extensive, or if the root cannot be removed by mechanical methods.

The City responds to emergency call-outs 24 hours a day, seven days a week. In many cases, the initial response person can fix the problem completely. If a total correction is not possible at that time, the line is made safe and useable, and the repair is completed as soon as possible, usually the next business day.